



EPP EXECUTIVE SUMMARY

This is the Final Report of the Phase 1 Evaluation of Efficiency Vermont's (EVT's) Efficient Products Program (EPP). The overall goal of the EPP is to increase the market share of efficient residential lighting equipment and appliances through a combination of customer incentives, retailer support, and broad-based marketing. This evaluation assesses the accomplishments of the program from its inception in March 2000 through December 2002.

E.1 INTRODUCTION

E.1.1 Program Description and Operations through May 2002

Program Objectives. The objectives of the EPP, as stated in the original program plan, are to :

- Increase market recognition of ENERGY STAR[®] labeled products;
- Increase the level of awareness and knowledge of consumer benefits of compact fluorescent lighting and energy-efficient appliances;
- Increase the level of customer adoption of efficient residential lighting and appliances;
- Increase retailer and dealer stocking and promotion of efficient residential lighting and appliances;
- Increase use of efficient lighting and appliances in multifamily and institutional residential markets.

Program Development. Both the lighting and appliance components built on predecessor utility programs that served most of Vermont's residential electric customers. Vermont electric utilities had offered programs to promote the purchase and use of compact fluorescent (CFL)¹ bulbs and, later, fixtures² more or less continuously since 1994. In late 1998, all of the Vermont utilities joined in a statewide rebate program based on the regional "StarLights" approach facilitated by the Northeast Energy Efficiency Partnerships (NEEP).

All of the major Vermont utilities except Washington Electric Coop had offered incentives for the purchase of resource efficient clothes washers beginning in late 1997. Most joined in the NEEP coordinated ENERGY STAR appliance program in 1999. The lighting component went into

¹ In this report, we use the term Compact Fluorescent Lamps (CFLs) to refer to light bulbs that use compact fluorescent technology and to permanent and portable light fixtures that are designed to accept compact fluorescent replacement bulbs only.

² Fixtures include permanent wall, ceiling, and exterior fixtures, as well as movable table lamps and floor lamps (torchieres).

operation in March 2000. EVT took over administration of the clothes washer rebate operations in March 2000.

Program Design and Operations. The following paragraphs describe the key features of the lighting and appliance components of the EPP.

- ***Customer Services and Incentives: Lighting.*** The lighting component offers instant coupons for the purchase of ENERGY STAR-qualified compact fluorescent bulbs and fixtures. Coupon values for compact fluorescent bulbs were initially set at \$8; they were lowered to \$7 by June 2000, then to \$4 by end of 2001 in response to evidence of increased availability, broader product selection, and lower prices for qualifying products. In June 2000, the program was opened to commercial as well as residential customers. Customers were permitted to purchase 6 bulbs and 4 fixtures at one time. Non-torchiere light fixture coupon values were initially set at \$20 and reduced to \$15 during 2001. In addition to instant coupons, the program has sponsored many special events to promote and sell efficient lighting products, including a number of torchiere turn-ins. Customers could also purchase compact fluorescent bulbs and fixtures at discounted prices through a catalog mailed to some residential customers. Catalog sales represented roughly 3 percent of units sold or rebated through the program.
- ***Customer Services and Incentives: Clothes Washers.*** All electric customers are eligible to receive incentives for the purchase of ENERGY STAR-qualified clothes washers. Rebates were set at \$75 during the first EVT program year. They were reduced in June 2001 to \$50. Predecessor utility programs offered rebates as high as \$200 and were set at \$100 during 1999.
- ***Retailer Services.*** The program offers a number of services to retailers participating in the program, including installation of point of purchase displays, assistance in ordering and stocking qualifying products, and sales staff training. These services were provided by the firm Advanced Proactive Technologies (APT) under contract to EVT. In addition to clothes washers, the program provided marketing support (but no customer incentives) for ENERGY STAR-qualified dishwashers, refrigerators, and room air conditioners. In order to receive support services and issue rebate coupons, retailers must sign a Memorandum of Understanding with APT, undertaking to maintain point of purchase displays, receive training, and permit APT to conduct inventories of qualifying products.
- ***Marketing.*** EVT participates in the national ENERGY STAR brand recognition effort, undertakes local advertising, and stages special promotion events to support the program.

Program Operations through 2002. Table E-1 summarizes key indicators of program activity for the first two years of program operation. Participation in the appliance component has held fairly steady over the life of the program. The number of ENERGY STAR clothes washers rebated each year has ranged from 2000 to 2,680, or 16 to 22 percent of the total annual sales of clothes washers. Participation in the lighting component increased rapidly after EVT assumed management of the program statewide. Total participation for predecessor programs averaged 9,000 to 10,000 customers, with the volume of CFLs and fixtures rebated hovering around

20,000. In 2000³, participation reached 13,608 customers, who purchased over 56,000 CFL bulbs and nearly 23,000 fixtures through the program. The number of customers participating increased by 79 percent from 2000 to 2001; the number of bulbs and fixtures rebated increased by 37 percent. In 2002, the number of customers purchasing efficient lighting through the program decreased by 19 percent, although the volume of bulbs and fixtures decreased by only 9 percent. Over the first three years of program operation, analysis of coupon redemption records found that 49,453 unique customers -- or 20 percent of all households -- purchased efficient lighting equipment through the program.

Table E-1
Summary of EPP Program Activities

Component/ Year	# of Stores Enrolled	# of Participants (Rebate Recipients)	# of Rebates Issued	Other Program Activities
APPLIANCES				
2000	60	2,476	2,476	Participation in national and regional ENERGY STAR promotion activities.
2001	91	2,563	2,563	Participation in national and regional ENERGY STAR promotion activities.
2002	91	2,370	2,370	Participation in national and regional ENERGY STAR promotion activities.
Total	91	7,409	7,409	
LIGHTING				
2000	105	13,608	Bulbs: 56,511 Fixtures: 22,887	Torchiere Turn-in: 3,000 halogen torchieres exchanged; 5,300 bulbs and 400 fixtures sold.
2001	108	24,342	Bulbs: 86,353 Fixtures: 22,294	36 Special Events: Torchiere turn-ins, home show booths, in-store promotions.
2002	125	19,802	Bulbs: 95,517 Fixtures: 15,522	31 Special Events through October.
Total	125	49,453	Bulbs: 237,722 Fixtures: 60,649	

E.1.2 Overview of the Phase 1 Evaluation

The key objectives of the Phase 1 EPP Evaluation were as follows.

Characterization of Baseline Conditions. The primary research questions addressed by the baseline characterization are:

- How large are the residential markets for compact fluorescent bulbs, lighting fixtures, and the four appliances covered by the program?

³ The program was launched in March 2000.

- What are the principal segments of the customer market and supply chains for those products?
- What were the conditions of the residential lighting and appliance markets around the time the EVT programs began in regard to supply-side actor promotion and customer acceptance of efficient products?

Assessment of Program Market Effects. Most of the research and analytical effort for this evaluation was expended to assess the effect of the EPP on sales of efficient lighting products and appliances and, where possible, to distinguish the effect of the program from other potential influences on customer and retailer behavior. Specific research questions in regard to market effects included the following.

- To what extent did participating and nonparticipating customers adopt efficient lighting equipment and appliances? How does their level of adoption compare to customers in similar situations who were not exposed to the program or some similar promotional effort?
- To what extent did participating retailers and other supply-side market actors promote and deliver efficient lighting and appliances? How do these practices compare to their behavior prior to enrolling in the program?

Process Evaluation. The key questions to be addressed in the process evaluation include the following.

- To what extent did program marketing efforts reach the targeted customers and supply-side market actors?
- How did customers and supply-side market actors use the program to help overcome barriers to the adoption/promotion of efficient lighting and appliances?

Recommendations for program improvement. Based on review of the analyses described above and experience in evaluating and operating other residential efficient equipment programs, XENERGY developed a set of recommendations designed to improve the performance and/or cost-effectiveness of the EPP.

E.1.3 Methods and Activities

To address the key research questions stated above, XENERGY undertook a broad range of research activities. In general, the methodological approach developed by XENERGY in consultation with DPS and other stakeholders involved the development of multiple observations on key indicators of program performance. Table E-2 summarizes the primary research and analysis activities undertaken for the EPP evaluation and presents some details regarding sample size and selection.

Introduction to findings and recommendations. As consumer products, light bulbs are quite different from appliances. They are much less expensive, less long-lived, and have lower operating costs. Moreover, the supply chains through which the two families of products reach consumers are quite different in terms of structure, the companies that inhabit the different levels, the roles of various groups in influencing customer decisions, and the broader interests of manufacturers. For these reasons, we present the results of the evaluation of the two components as if they were separate programs.

Table E-2
Summary of EPP Evaluation Primary Research and Analysis Activities

Activity/Objectives	Description/Sample Approach & Size
SUPPLY-SIDE ANALYSIS	
<i>Analysis of retailer stocking and pricing practices.</i> <ul style="list-style-type: none"> Develop observations over time of the number or percentage of program-qualified models available at retail outlets. Develop information on types of products available over time. Develop information on pricing of efficient products and incremental cost v. standard efficiency products. 	<ul style="list-style-type: none"> Data source: Appliance and lighting floor inventory data collected semi-annually by APT. Appliances: Data available for 60 stores representing ~ 90% of all appliance VT. retailers. Lighting: Data available for 100 stores: home centers, hardware, lighting specialty, discount department stores.
<i>Retailer Survey</i> In-depth interviews to probe: use of ENERGY STAR in marketing and sales; perception of the effects of the program on customers ; sales and promotion practices for energy efficient products pre and post program.	<ul style="list-style-type: none"> Appliance Sample: 12 stores selected to represent population in terms of size, location and type of store. Lighting Sample: 12 stores selected to represent population in terms of size, location and type of store.
<i>Appliance Mystery Shopper</i> Scripted shopping trips to retailers to: gauge effectiveness of point of purchase display, sales staff initiative in selling efficient products, sales staff knowledge of efficient products, sales staff effectiveness in selling efficient products.	Mystery shopper visits made to 8 stores – subset of the appliance retailer interview survey.
DEMAND-SIDE ANALYSIS	
<i>On-site Customer Survey</i> Capture information on number, type, location of lighting fixtures; saturation and efficiency of appliances, opportunities for additional measures not yet offered, ENERGY STAR and program recognition	Random sample of VT residents eligible for program using commercially-available listing service as the sample frame. 71 in-home surveys completed.
<i>Pre-EVT Program Analysis</i> Review reports of predecessor lighting programs to assess contribution to product adoption.	Sources include annual reports of utility energy efficiency program activities filed with DPS, market studies and evaluations.
SALES AND MARKET SHARE TRACKING	
<i>Sales Data Analysis</i> Obtain sales lighting and appliance sales data covering past several years from a representative group of stores in VT and comparable stores in areas without programs. Analyze sales data to estimate efficient product sales outside the program and assess extent of spillover.	Sources used include data collected from retailers in Vermont and Maine, rebate and coupon processing data maintained by APT and EFI, state and national appliance sales data maintained by the American Household Appliance Manufacturers and the DOE ENERGY STAR program.
PROCESS EVALUATION Assess effectiveness of program operations, identify opportunities and strategies for improvements.	Interviews with program staff, contractors, and retailers; review of program records and materials

E.2 LIGHTING COMPONENT

E.2.1 Key Findings

Volume of Customer Participation

The lighting component of the EPP did a very good job of reaching targeted customers and in encouraging them to use the program to purchase compact fluorescent bulbs and fixtures.

- ***Rapid increase in participation.*** During the eight years prior to transition to EVT management, utility operated residential lighting programs attracted total participation from roughly 73,500 customers, who purchased 162,000 bulbs and fixtures. In its first 34 months of operation, the EPP lighting component, 49,453 unique customers participated, purchasing 298,371 bulbs and fixtures. Observers attribute this rapid uptake in participation to a number of factors, including association of the ENERGY STAR label with compact fluorescent bulbs and fixtures, simplified procedures for retailers, and intensive public relations efforts in the first two years.
- ***High portion of fixture sales.*** For a variety of reasons, compact fluorescent fixtures have experienced low sales and market share. Therefore, the share of fixtures among all units sold through the program is a useful indicator of its market effects. Over the first 34 months of operation, customers purchased 60,649 fixtures through the program. This was 20 percent of all pieces of lighting equipment receiving incentives through the program and nearly 8 percent of all lighting fixtures sold in the state during the study period.⁴
- ***Downturn in first-time participants.*** As mentioned above, the number of customers participating in the program decreased by 19 percent between 2001 and 2002. However, the percentage of ‘repeat customers’ in the EVT program increased from 12.4 to 26.7 percent. This finding may indicate a number of different market developments. As discussed below, prices for CFL bulbs have come down, and customers may be willing to purchase them without a rebate. The finding may also indicate that the program is beginning to saturate the market segment of interested customers and may need to explore marketing strategies to attract consumers who have not yet tried efficient lighting products. Subsequent rounds of the evaluation will track this trend and research its underlying causes.

Retailer Participation

The program has consistently enrolled and supported a high percentage of the retail locations that carry compact fluorescent products. There are 148 hardware stores, discount department stores, home centers, and lighting specialty stores in Vermont. Of these 108 were found in the program coupon database. Several others have signed Memoranda of Understanding. However precise

⁴ See Section 3 for a description of the estimate of total residential fixture sales in Vermont.

tracking of the number of stores that are active in processing coupons was complicated by inconsistencies in retailer identifying information stored in the database.

Market Effects: Net Bulb and Fixture Sales due to Program

XENERGY undertook the following data collection and analysis tasks to assess the effect of the program on CFL bulb and fixture sales.

- ***Analysis of CFL Bulb Sales and Rebate Data.*** Working with APT, XENERGY obtained and analyzed data on unit sales of CFL bulbs from five Aubuchon and five True Value hardware stores spanning last three quarters of 2000 and all four quarters of 2001. We also obtained sales records for CFL bulbs from seven stores in Maine: five Aubuchon locations and two True Value locations.
- ***Analysis of current saturation estimates.*** As part of this evaluation effort, XENERGY conducted a survey of 71 homes during the summer of 2002. The survey gathered detailed information on the number, room location, and type of fixtures and light bulbs.
- ***Comparison with point-of-sale data.*** XENERGY made use of quarterly estimates of sales of CFL bulbs in the United States and California based on analysis of check-out scanner data to assess the plausibility of sales and market share estimates developed from the local Vermont sources identified above.
- ***Comparison to results of similar studies.*** Recent studies in the Northwest have developed well-grounded estimates of CF bulb sales with and without rebates, based on sales data provided by a large sample of retailers participating in rebate and other promotional programs.

Using these data we developed estimates of total sales of CF bulbs for 2000 and 2001, as well as estimates of CF bulb saturation, and ran a number of consistency checks between these estimates.

The volume of CFL products sold in the sample of Vermont stores increased substantially between program inception in the first quarter of 2000 and the end of 2001. For the five Aubuchon stores in the sample, total sales of CF bulbs were 4,245 in the last three quarters of 2000 and 6,295 in 2001. According to store managers, unit sales in 1999 totaled roughly 1000.

A significant portion of total CFL purchases in Vermont sample stores were made without the benefit of program incentives. For the 10 hardware stores included in the sales record sample the weighted average of CFLs purchased without incentives was 56 percent. There are several questions yet to be resolved about the degree to which the sample represents the total market, the comparability of the sales data with the incentive data, and the accuracy of the data provided by the corporate office. Anecdotal information on total sales of CFL bulbs by Home Centers suggests that their portion of CFL bulb sales outside the program was significantly less than was found among

hardware stores. Home Centers accounted for 22 percent of CFL bulb coupon redemptions. This issue will be resolved through future evaluation efforts.

Saturation of CFL in Vermont households bulbs is high. Forty-nine percent of the households in the on-site survey had at least one CFL bulb installed, with a mean of 1.6 screw-in bulbs per customer, averaged over all households. The on-site sample included only homeowners. After adjusting for lower saturations for renters, we estimated that roughly 300,000 – 320,000 CFLs are currently installed in Vermont homes. This saturation level is far higher than estimates from previous market studies.

Estimates of unrebated sales. XENERGY used varying sales estimates to develop a stock replacement model to estimate the total number of compact fluorescent bulbs installed in 2002. The results of this exercise showed that current observed levels of CFL saturation were consistent with CFL bulb purchases without use of coupons in the range of 30 to 50 percent of total annual total sales. Evaluations of residential lighting programs conducted in the late 1990s found evidence of “outside program sales” in the range of 30 percent, based on the results of telephone surveys of random samples of customers. A recent study of a regional program in the Pacific Northwest estimated outside program sales in the range of 43 percent of the regional total in the last two quarters of 2001, based on analysis of sales data from stores in the program area.⁵

- ***Assessment of net program impacts on CFL bulb purchases.*** The study collected a significant amount of data on CF bulb sales that suggest that the program had a strong positive effect on CF bulb purchases. In addition to the analysis of unrebated sales, data collected supported comparisons between the hardware stores in Vermont and Maine in the volume of CF bulb sales; comparison of sales before and after program inception in Vermont; and comparison of point of sale data between Vermont, California, and the rest of the country. These analyses all suggested that the program has had a strong net impact. However, in the absence of customer survey data on the influence of the program on customer purchase or more extensive cross-sectional analyses, we cannot develop a quantitative estimate of net program effects on CF bulbs sales.

Energy savings associated with CFL bulb purchases represent a large portion of total savings for EVT’s portfolio of residential programs. Therefore, development of methodologically sound estimate of total CFL bulb sales is critical to program evaluation efforts. Subsequent evaluation activities will focus on identifying and developing reliable sales estimates. Candidate data sources include an expansion of the sample of stores from which sales data are collected and purchase of check-out scanner data compiled by national market research organizations.

Program Effects on Retailer Stocking and Promotion of CF Products

- ***The availability and cost of ENERGY STAR CFL bulbs has substantially improved.*** The variety of CFL bulb models stocked by each store increased by 22%, from 4.5 to 5.5, between early 2001 and the end of 2002. In addition, nearly six times as many models

⁵ ECONorthwest. 2002. *ENERGY STAR Residential Lighting Program: Market Progress Evaluation Report*. Portland, OR. The Northwest Energy Efficiency Alliance.

now carry the ENERGY STAR label (82% of all models). Lastly, prices for ENERGY STAR models decreased by more than 13% during this time.

Availability of CFL torchieres has increased. Eighteen percent of participating stores stocked CFL torchieres, up from only 8% in early 2001

E.2.2 Process Evaluation and Recommendations

The findings presented in Sections 2, 3, and 4 show that the lighting component of the EPP was well designed to meet the objectives of increasing customer purchase and retailer support of compact fluorescent lighting products, both bulbs and fixtures. They also show that the program has been diligently executed, with a high level of attention to promotion and dealer support.

The findings reviewed above suggest that there are two areas in which EVT could take steps to improve the already good performance of the program.

Attract new customers to the program. Analysis of rebate records from 2002 indicate that the number of first-time participants in the program has fallen off by 32 percent from 2001 levels. These data may suggest that the program is reaching saturation for the most interested customer segments, and that actions need to be taken to broaden its reach. EVT has already taken a several steps in this direction, including sending catalogs via direct mail to customers who have not yet participated and to those who live in remote areas. Other tactics to reach new customers could include staging promotions in or near retail outlets such as supermarkets. These kinds of retail establishments attract customers who simply do not frequent the kinds of establishments such as home centers and hardware that stock and sell large volumes of CFLs.

Target remodelers for promotional efforts. The findings also suggest that the use of CFL fixtures by remodelers remains low. Remodeling projects account for nearly one-fourth of permanent fixture purchases. To reach this market, we recommend the following.

- ***Develop a remodeler efficient lighting package.*** Such a package might be similar to the bundle of lighting measures developed for the new construction program, accompanied by a rebate and materials that can be used to inform remodeling customers of the benefits of CF fixtures.
- ***Conduct a direct-mail program to remodelers to publicize the availability of the remodeling lighting package.***

E.3 APPLIANCE COMPONENT

Volume of Customer Participation

Efficient clothes washers can provide significant energy savings in water heating and drying. For this reason, Vermont utilities as early as 1997 began offering incentives for their purchase. Dealer services to support sales other efficient appliances, including dish washers, refrigerators, and room air conditioners, has been consistently linked to washing machine incentives. This support has included sales staff training, point-of-purchase marketing materials, and special promotions or contests for ENERGY STAR qualifying appliances. The linkage between the incentive offer for clothes washers and promotion of other appliances without the use of incentives has encouraged the stocking and sales of all efficient appliances even though incentives have not been generally available for them.

The design of the program has made it relatively easy to track its impact on clothes washers compared to the other appliance. For this reason, much of the following discussion is focused on clothes washers.

The utility-sponsored predecessor “TumbleWash” program provided mail-in rebates for approximately 1950 efficient clothes washers in 1998 and 2,680 washers in 1999. Comparison of program activity to shipment data from the Association of Home Appliance Manufacturers (AHAM) suggests that practically all purchases of resource-efficient clothes washers in these years received incentives through the program. The annual number of units rebated held fairly constant from 1999 through 2002, at roughly 2,500, or about 20 percent of all clothes washer sales in the state.

Retailer Participation

Comparison of program records to Dun & Bradstreet data on the number of mass merchandisers and appliance stores show that practically all businesses that sell appliances in Vermont are enrolled in the program. Participation is defined as signing a Memorandum of Understanding maintaining point of purchase displays, receiving training, offering incentives, and permitting periodic inventories of qualifying products. This is a significant accomplishment that can be attributed to the design of the programs and the efforts of implementers over time.

Operation of Appliance Markets

Analysis of data on ENERGY STAR model availability, appliance sales, rebates processed, and models displayed from chain and independent retailers provided a number of key insights into the operation of Vermont’s appliance markets during the program period. The following paragraphs summarize this analysis.

Table E-3
Overview of Key Market Indicators Appliance and Year

	1999	2000	2001
CLOTHES WASHERS			
Number of ENERGY STAR Models Available	35	64	84
<i>Vermont ENERGY STAR Percent Models Displayed*</i>			
Chain	12%	17%	19%
Independent	26%	29%	31%
All Stores in Sample	22%	25%	28%
<i>Vermont ENERGY STAR Market Share</i>			
Chain	14.5%	22.6%	22.6%
Independent	28.0%	31.0%	37.0%
Weighted Average	26.3%	27.3%	32.3%
<i>US Market Share (Chains)</i>	8.5%	9.3%	10.3%
REFRIGERATORS			
Number of ENERGY STAR Models Available	331	301	58
<i>Vermont ENERGY STAR Percent Models Displayed</i>			
Chain	31%	45%	32%
Independent	14%	23%	11%
All Stores in Sample	21%	30%	20%
<i>Vermont ENERGY STAR Market Share</i>			
Chain	28.1%	31.0%	14.9%
Independent	12.0%	13.0%	8.0%
Weighted Average	19.4%	21.2%	11.2%
<i>US Market Share (Chains)</i>	24.4%	27.0%	17.3%
DISHWASHERS			
Number of ENERGY STAR Models Available	173	265	158
<i>Vermont ENERGY STAR Percent Models Displayed</i>			
Chain	13%	23%	28%
Independent	36%	49%	43%
All Stores in Sample	31%	41%	41%
<i>Vermont ENERGY STAR Market Share</i>			
Chain	7.5%	8.1%	14.8%
Independent	51.0%	58.0%	64.0%
Weighted Average	34.7%	39.4%	45.6%
<i>US Market Share (Chains)</i>	12.4%	10.9%	19.9%

* According to market observers interviewed for the evaluation, the inventory on display closely reflects the inventory in warehouses.

The markets for clothes washers, dishwashers, and refrigerators need to be analyzed separately. Federal and ENERGY STAR standards changed at different times and degrees for clothes washers, refrigerators, and dishwashers, and that pattern will continue. Different segments of the retailer channel appear to take different approaches to stocking and selling ENERGY STAR models of the various appliances. Independent retailers stocked and sold significantly higher percentages of ENERGY STAR clothes washers and dishwashers than chain outlets. This relationship was reversed for refrigerators and room air conditioners. This pattern was also identified by studies in California.

Product availability was extremely volatile during the baseline and early program periods. Whereas the number of ENERGY STAR-qualified clothes washer models increased regularly over the period 1999 – 2001 (and into 2002), the number of qualifying refrigerators, dishwashers, and room air conditioners fluctuated widely during the period. This was due, in part, to the introduction of new ENERGY STAR specifications and changes in the federal standards for refrigerators.

Retailers exercise a great deal of discretion over stocking and promotion. Virtually all appliance store and appliance department managers interviewed reported that they personally made inventory purchase, display, and pricing/promotion decisions locally. As Table E-3 shows, the percentage of ENERGY STAR models stocked varies much less from year to year than do the number of models available or ENERGY STAR market share. To some extent, this relative stability reflects the physical limitations of showroom floors, the need to display a range of models, and niche marketing strategies among independents.

Assessment of Net Program Effect on ENERGY STAR Appliance Purchases

Basic Approach. To assess the net effect of the EPP on the market share ENERGY STAR appliances in Vermont, XENERGY estimated a regression model of market share of an ENERGY STAR appliance at the state level by appliance type and year. The independent variables in the model included the state's median income in 2000, the percentage of individuals over 25 with a Bachelors degree, and the presence of appliance incentive programs available to the majority of households in the state. The dependent variable was the state's ENERGY STAR market share for a specific appliance and year, as measured by the U. S. Department of Energy's sales tracking system. This system covers only large national chain retailers.

We estimated the model for each appliance in each year 1999 – 2001 for which complete data were available ENERGY STAR market share. Complete data were available for all years and appliances except room air conditioners in 1999. We then took the following steps to generate estimates of the net effect of the Vermont EPP on ENERGY STAR market share for each appliance and year.

1. Examine the model results to assess its suitability for estimating ENERGY STAR market share. This involved examining the sign and statistical significance of the coefficients and the portion of total variation in ENERGY STAR market share that the model accounted for (R^2). The model was accepted for further use in the analysis if the coefficients were

statistically significant at the 10 percent probability level and had the expected signs, and if the F statistic for the model exceeded the critical value.

2. Apply the model results to estimate Vermont's ENERGY STAR market share with and without the presence of the program. This involved enumerating the model with Vermont's demographic variables with the indicator variable for the presence of the program set at 1, then at 0.
3. Estimate the net effect of the program on the market share of ENERGY STAR appliances sold by retailers reporting to the DOE sales tracking system. This effect was estimated by the difference between the actual market share and the estimated share with the program indicator variable set to 0. This value represents statistically what the Vermont market share for the subject appliance would have been if the program had not been available, taking into account the market share in the 49 other states with their different programs and demographic conditions.
4. Adjust the net program effect on market share to account for differences in Vermont between the chain retailers represented in the DOE database and independents in the percentage of ENERGY STAR appliances sold, by appliance type and year.

Summary Results of the Net Effects Analysis

Table E-4 summarizes the results of the modeling effort described above for 2000 and 2001, the years in which the EVT program was in operation. The following paragraphs explain these results and provide our recommended estimates of net program effects on ENERGY STAR appliance market share.

Table E-4
Net Impacts of the EPP: Unit Sales and Energy Savings

		Net Program Effects		
Appliance/Year	Observed E STAR Share	Adjusted Difference in Market Share*	Sales in Units	Energy Savings MWH/Year
Clothes Washers				
2000	27.3%	15.1%	1,577	946
2001	32.3%	13.9%	1,741	1,045
Dishwashers				
2000	39.4%	0.0%	-	
2001	45.6%	7.3%	620	90
Room Air Conditioners				
2000	22.0%	2.5%	178	13
2001	19.8%	0.2%	14	1

*Difference between the model estimate with the program variable set to 0 and the observed share for chain stores adjusted to reflect the relative volume of sales and market share of ENERGY STAR models among independent retailers in VT.

Clothes washers. In 2000, the model estimate (with the program statistically accounted for) was significantly below the observed figure, 16.5 percent v. 22.6 percent, a difference of nearly 30 percent. We nonetheless concluded that the difference between the observed level and the model estimate with the program variable set to 0 was a fair estimate of net program impacts in 2000. The main factor we considered in making this judgment was that Vermont consumers generally had not purchased other ENERGY STAR appliances that offer fewer economic advantages in greater proportion than consumers nationwide. In 2001, the model estimate of chain store market share was quite close to the actual figure: 20.1 percent v. 22.6 percent. We concluded that the difference between the observed ENERGY STAR market share and the model estimate without the program was a fair representation of the net effects of the program in 2001.

Thus, applying the methods described above, we estimate that the EPP accounted for a net difference in Vermont's market share of ENERGY STAR clothes washers of 15.1 percent (1,577 units) in 2000 and 13.9 percent (1,741 units) in 2001. In 2002, actual market share of ENERGY STAR clothes washers sold by stores reporting to the DOE system was 33.5 percent, versus a model estimate of 27.9 percent. This result is somewhat surprising in light of the slight downturn in the number of rebates issued between 2001 and 2002. It indicates that acceptance of ENERGY STAR clothes washers is growing more rapidly among customers in Vermont than in other states that operate clothes washer rebate programs.

Dishwashers. The model did a good job of predicting the actual market share for ENERGY STAR dishwashers in Vermont. The model estimate for 2000 was 9.5 percent v. the actual 8.1 percent; 15.3 v. 14.8 percent in 2001. We concluded that the comparison of the actual market share to the model estimate with the program variable set at 0 was a reasonable estimate of net market effects. In 2000, this difference was – 1.4 percent. We therefore set the net program effect on ENERGY STAR dishwasher sales to zero for 2000. In 2001, after making adjustments for sales by independents, the net contribution of the EPP to ENERGY STAR dishwasher market share was 7.3 percent. In 2002, the market share model did not yield statistically significant results. Vermont's ENERGY STAR market share, at least among retailers reporting sales to DOE, was 27.5 percent versus 36.4 percent for the nation as a whole. However, the market share among Vermont retailers reporting to DOE nearly doubled between 2001 and 2002, so some progress on selling ENERGY STAR dishwashers has clearly been made.

Room Air Conditioners. The room air conditioner models did a good job of predicting actual ENERGY STAR market share in 2000 and 2001. Our overview of the room air conditioner market share data suggested that the impact of promotion programs on ENERGY STAR model adoption was rather small in 2000 and 2001, and this was born out by the model results. However, in 2002, EVT offered rebates for ENERGY STAR qualified air conditioners. The market share for qualifying models leapt to 61.3 percent from 19.8 percent in the previous year. The model estimated market share was 47.6 percent. Thus, as was the case with clothes washers, Vermonters responded much more vigorously to program incentives than did customers in other states, even those such as Connecticut and New York, which had rebates targeted to ENERGY STAR air conditioners.

Refrigerators. Vermont's ENERGY STAR market share for refrigerators has been highly erratic, both in absolute level and in relationship to the national and regional figures. In 1999 and 2000, Vermont's market share was relatively high – 28 to 31 percent. This was slightly higher than the national average and 50 to 70 percent higher than the share in other states in which the NEEP program was operating. In 2001, however, Vermont's market share dropped to 14.9 percent, below the national average and well below the levels in the other NEEP states. Thus, in 2000 and 2001, we attribute no effect to the program on market share.

In 2002, a number of states including Vermont, Connecticut, and California offered rebates for ENERGY STAR qualified refrigerators. The model yielded statistically significant results. The observed market share of qualified refrigerators in Vermont was 24.8 percent versus a model-estimated share of 22.9 percent. These results suggest that the program had an effect on market share. However, given that independent retailers who do not report to the DOE sales tracking system have historically sold a lower portion of ENERGY STAR models than the retailers that do report, sales data from independents will be required to support a more definitive assessment of the program effects.

E.3.2 Process Evaluation and Recommendations

Findings

Retailer response to the program. Retailers interviewed for this evaluation gave consistently high marks to EVT and APT for all aspects of program administration and support: product placement, sales force training, and rebate processing. On a scale of one to five, with one being “very poor” and five being “very good”, a sample of retailers rated Efficiency Vermont's services at 4.5 for assistance with in-store promotions, 3.4 for training, and 4.8 for rebate processing. The same sample rated the importance of stocking ENERGY STAR appliances in relation to their overall business goals at 7.9 on a scale of one to ten.

Retailer practices. Mystery shopper visits conducted for the evaluation found that the sales staff effectively promoted ENERGY STAR clothes washers, for which rebates were available, but did little to promote the other appliances addressed by the program. Moreover, their general level of knowledge concerning the meaning and interpretation of the EnergyGuide and ENERGY STAR labels were low, and their representation of various models as ENERGY STAR-compliant was occasionally inaccurate. For example, only 8 percent of the refrigerators that were represented as energy efficient actually qualified for the ENERGY STAR label. We note, however, that sales staff's general level of knowledge about ENERGY STAR and the benefits of efficient appliances has increased significantly since 1999, when a Vermont baseline research effort also conducted Mystery Shopper visits.

There are a number of potential explanations for the finding that salespersons were much more enthusiastic and effective at selling ENERGY STAR clothes washers than the other covered appliances.

- Resource-efficient clothes washers have been eligible for rebates in Vermont since 1997, whereas other appliances have not been eligible for rebates.
- With recent changes in federal standards, the difference in energy consumption between standard and ENERGY STAR refrigerators and dishwashers is meager.
- Salespeople focused their attention and energy on learning about equipment that was eligible for rebates, which help overcome customer objections to higher initial cost.

Recommendations

As discussed in Section 6 of the full report, the four appliances supported by the ENERGY STAR appliance program are subject to very different market dynamics on both the consumer and supplier sides. We therefore develop our recommendations in regard to the separate appliances rather than for the program as a whole.

Clarify program design in regard to refrigerators, dishwashers, and room air conditioners.

The results of the analysis in Section 6 suggest that the program is having relatively little effect on retailer practices or customer purchases in regard to refrigerators, dishwashers, and room air conditioners. The findings also suggest that the circumstances that lead retailers to promote ENERGY STAR models (or not) differ between independents and chain establishments, and that these circumstances may differ between independents in various niche markets. Given these findings, XENERGY believes it would be worthwhile to gather information from retailers regarding their motivations and barriers to promoting specific ENERGY STAR appliances, to brainstorm program ideas that might result in a more consistent level of effort, and to review the proposed program initiatives that emerge from this process. The process of gathering information could be conducted within the context of the next round of evaluation, and could take the form of in-depth interviews or focus groups. We recommend that EVT and APT staff participate in the process, as well as selected retailers.

We should note that EVT has already taken steps to strengthen program support for refrigerators and room air conditioners. These steps include initiation of rebate offers for those appliances and provision of help to retailers in identifying qualifying products at various price points to meet customer needs and preferences.

Clothes Washers: Retention of customer incentive. Given the growing market share of ENERGY STAR clothes washers nationwide, the high volume of purchases outside the program in Vermont, and the impending increase in federal minimum efficiency standards, it may seem tempting to remove or reduce the incentive. We believe that retention of the incentive for 2003 is warranted for a number of reasons. First, the net effects analysis estimated that the program stimulated purchase of 1,741 ENERGY STAR units in 2001, compared to program sales of 2,563. This suggests that a large portion of the customers who are interested in resource-efficient washers still need the incentive to help them overcome objections to the high incremental cost. Also, in the case of products such as refrigerators and electric motors, promulgation of new federal standards was preceded by steep price cuts in lower-end products as manufacturers and

distributors dumped non-complying inventory. This will likely happen in the clothes washer market as well. Incremental costs are likely to increase as 2004 approaches, so it will be a good idea to leave the incentive in place.

E.3.3 Additional Appliance-Related Savings Opportunities

Analysis of the on-site survey data identified the following opportunities for significant energy savings in appliances.

- ***Early retirement of refrigerators and freezers.*** Based on the results of the survey, we estimate that there are over 80,000 refrigerators and 76,000 standalone freezers currently in use in Vermont homes that are older than their engineering useful life – 14 years. The metered use of units from this vintage averages over 2000 kWh per year, versus 550 – 1000 kWh per year for comparable new units of standard efficiency.⁶ Moreover, nearly 15 percent of the refrigerators installed were second units, most of which were in continuous use. The considerable gross energy savings available from removal or replacement of very old units, combined with the large number of applicable units identified suggest that further development of refrigerator retirement program details and measure screening efforts are justified.
- ***Energy Star freezer promotion.*** The Department of Energy is currently considering adding stand alone freezers to the roster of products eligible to receive the ENERGY STAR label. The labeling specifications under consideration would result in unit energy savings of 40 – 60 kWh per year for the most common sized models. Freezer shipments have been rising recently and, should the ENERGY STAR specification be promulgated, it may be worthwhile to support freezers as part of the EPP.

⁶ See XENERGY Inc. (1998). *Impact Evaluation of the Spare Refrigerator Recycling Program Final Report*. Prepared for Southern California Edison, San Dimas, CA.